Seating for Amphibious Vehicles

The present invention relates to an amphibious vehicle having a seat adjustable in a fore and aft direction relative to a floor of the vehicle.

BACKGROUND OF THE INVENTION

Amphibious vehicles normally have at least the driver's seat adjustably mounted to the floor of the vehicle by means of a track comprising a pair of rails attached directly to the floor. The seat engages with the track by means of rollers and a latch is provided to hold the seat at a particular position by latching onto the rail. This type of arrangement is also used for normal road vehicles. A problem with amphibious vehicles is that when they are open topped, water splashes into the vehicle and may slop around on the floor; and sand may also blow into the vehicle. The combination of sand and water in and around the seat track may well cause corrosion and/or jamming of the seat on its track. This would be the situation if a seat mounting of the sort shown in US Pat. No. 4,889,379 (Aso) were fitted to an amphibious vehicle.

A further problem is that steering an amphibious vehicle in its marine mode requires the driver to sit higher than the position best suited for road use. This is even more the case where the vehicle is designed to plane, as a favourable static weight distribution to allow planing is tail heavy, so that the vehicle sits nose up when afloat; and even more nose up when planing. Passengers may also appreciate the option of a higher seating position on water, for improved visibility, and for the exhilaration of the wind in their faces. However, a lower seating position on land is preferred to allow better protection from wind and in vehicle collisions; also greater comfort at the higher speeds attained on roads than on water.

If a higher seating position is offered for marine use, the centre of gravity of the vehicle occupants will be raised, compared to their centre of gravity on road. If conventional seat mountings are used, with dual seat tracks below the seat and inboard of the edges of the seat, the vertical distance from the seat mounts to the occupant's torso is much greater than the lateral distance between the seat tracks. The seats may oscillate as the occupants shift from side to side according to the movement of the

vehicle, causing the occupants to feel insecure. The high bending moments applied to seat and mounting components may also cause rapid wear.

The issue of perceived seat stability is particularly germane to a centre mounted seat, as there is no practical possibility in this case of the occupant restraining himself or herself against the vehicle interior trim on door, side panel, or centre console, should the seat mounting be considered to have lateral movement beyond the occupant's envelope of comfort and security.

SUMMARY OF THE INVENTION

The object of the invention is to provide an arrangement for support of a seat sufficiently far above the floor of an amphibious vehicle to avoid the above problems; and to enable the driver to sit above the road seating position so as to assist steering when on water.

Accordingly, there is provided an amphibious vehicle having a seat frame structured to support a seat, the frame being adjustable in a fore and aft direction relative to a floor by means of an adjustment arrangement, the arrangement comprising at least a first part and a second part, the first part mounted fixedly to the seat frame and the second part co-operating with the first part and mounted fixedly with relation to the floor, above the floor and level with or above the bottom of the seat frame, wherein the seat frame has a tip-up seat pivotally mounted thereto so as to provide two levels of seating.

Such an arrangement according to the invention ensures that the seat adjustment mechanism is above the dirt and slop level, and reduces the likelihood of jamming caused either by corrosion; or by the build-up of material in and around tight fitting parts. The arrangement also enables the driver to assume an elevated sitting position when on water. Furthermore, seat mountings according to the invention have a lower ratio of cushion height to mounting width than prior art amphibious vehicle seats, allowing provision of a more stable seat mounting with greater resistance to wear in service.

The co-operating parts of the seat adjustment mechanism may be a slide and a rail; or a roller or rollers and a rail. These parts may be mounted so that the rail is fixed in relation to the floor of the vehicle, or so that the rail is fixed to the seat. The co-operating parts are preferably mounted well above the floor, and in one embodiment of the invention the inter-engagement between the co-operating parts is at a level at about the same as the top of the seat cushion, the seat cushion being distinct from the backrest. At this latter level, a latch for fixing the seat adjustment is more convenient than at a level below the seat, as is normal with known arrangements. Furthermore, electrically operated seat adjustment can be kept well away from water and slops. The rails may face upwards, downwards or sideways depending on the room available for mounting on either side of the seat. Where the rails are mounted facing sideways, the seat may have flexible splash guards fixed to the seat above the rails on either side of the seat to further guard the track.

Although the seat mounting according to the invention is considered to be most advantageous when applied to a driver's seat, it is equally suitable for passenger seating in a first or further row of seating. The driver's seat may be to one side of the vehicle, or may be centrally mounted to ensure equal visibility to either side of the vehicle, particularly in marine mode. The vehicle may be a planing vehicle.

The above and other objects, features and advantages of the present invention will become apparent from the following detailed description, which is to be read with reference to the accompanying drawings in which:

BRIEF DESCRIPTION OF THE DRAWINGS

Figures 1 to 4 are front elevations of four different arrangements of sliding and rolling mountings for seats according to the invention;

Figure 5 is a side elevation of a sliding arrangement according to the invention similar to that shown in Figure 1;

Figure 6 is a side elevation of a rolling arrangement according to the invention similar to that shown in Figure 2;

Figure 7 is a perspective view of the seat shown in Figure 5 seen from a partly starboard angle;

Figure 8 is a perspective view of the seat shown in Figure 5 from a partly port angle;

Figure 9 is a side view of a seat mounting according to the invention, compared to the prior art;

Figure 10 is a front view of a seat mounting according to the invention, compared to the prior art; and

Figures 11 and 12 are figurative side views of a planing amphibious vehicle according to the invention, showing the visibility advantage of a dual height seating system.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Figure 1 shows a seat generally at 2 having a frame 4. A tip-up seat cushion 8 is pivotally mounted at pivots 6 and 6' – see also Figures 5, 7 and 8 for similar seats. In Figures 7 and 8 the tip-up seat 8 is shown in the down/road driving position in solid lines: whilst the seat 8 is shown in the up/water driving position in broken lines. The seat 8 has a locking handle 13 on one side, which operates as shown in figure 5. Handle 13 actuates pin or bar 15, shown in broken lines; which in turn engages one of two notches 17, 17' in circular plate 19 on the pivot axis 6-6', to hold tip-up seat 8 in one position or the other.

The driver or helmsman sits on the tip-up cushioned seating area 10 when the seat is in the up, or water, position; and on seat cushion 12 when the seat is in the down, or road, position. Numeral 14 denotes the backrest.

A further locking handle 18 is provided on the other side of seat 2 to handle 13. This further handle is used to lock the fore-and-aft adjustment of the seat, by latch means known in the vehicle seating art.

The seat 2 is mounted well above the floor 16 of the vehicle on brackets 20 either side of the seat by means of co-operating parts; enabling the seat to be adjustable in a fore and aft direction relative to the floor 16 as will be described.

So far each embodiment is much the same; and the same reference numerals are used for similar or identical parts.

In Figures 1, 5, 7 and 8, the co-operating parts are firstly slide rails 22 fixed to the brackets 20 on either side above the bottom 23 of seat 2; and secondly slide blocks 24 fixed to frame 4 of seat 2. The brackets 20 are of course fixed to the floor 16 of the vehicle. In order to stop water splashing onto the co-operating parts, flexible flaps 26 are fixed to seat frame 4. These may be treated with friction decreasing material at 27 where they engage the top of brackets 20.

In Figure 2 and Figure 6, slide blocks 24 are replaced by roller blocks 28; and rails 22 are replaced by rails 30 arranged to receive rollers 32 in roller blocks 28.

In Figure 3, slide rails 34 are mounted on the tops of brackets 20. The rails co-operate with slide blocks 36 mounted underneath, and fixed to, brackets 38. In Figure 4, brackets 38 are replaced by a cradle 40 with extending arms 42. The cradle supports the whole seat 2. Arms 42 have rails 44 fixed below, which co-operate with slide blocks 46 mounted on the top of brackets 20.

In Figure 9, the tip up seat 8 is shown in its lower, or road going position, and in is upper, or marine position. A seat track 30 is shown according to the invention; and a further seat track 30' is also shown in a floor mounted position typical of prior art. A height HU is shown from a marine seating position, with the foam compressed by the weight of the driver, to the seat track according to the invention. A further height HL is also shown from a road seating position to the seat track according to the invention; and finally, a height HF is shown, from a road seating position to the centre height of floor mounted seat track position typical of prior art. As the compression of the foam will vary according to driver weight, the following typical dimensions are measured with foam uncompressed: HU equals 277mm; HL equals 121mm; and HPA equals 201mm. Were a tip-up seat according to the invention to be mounted on prior art seat mountings, the height from a tip-up seat to floor mounted seat tracks would be HUPA, equal to 357mm.

Similarly in Figure 10, slide rails according to the invention are shown at 22; and floor mounted slide rails typical of prior art are shown at 22' and at 22''. The width between seat mountings 22 according to the invention, WI, is typically 504mm; whereas the width between floor mounted slide rails typical of prior art WPA is typically 420mm.

A measure of the stability of the seat in use may be found by dividing the width between seat mountings by the height from seat cushion to seat mounting. Using the above figures, this stability ratio is: 1.82 for the marine seating position according to the invention, as opposed to 1.18 for the marine seating position with a prior art seat mounting; and 4.17 for the road seating position according to the invention, as opposed to 2.09 for the road seating position with a prior art seat mounting. It should be noted that these figures would demonstrate an even greater advantage over prior art were the seat track position of Figure 3 to be used instead. It is preferred that the stability ratio is at least 1.50, more preferably 1.75, in marine mode; and at least 3.50, more preferably 4.00 in road mode. To limit the space taken up by seat mountings in the width direction, the stability ratio should preferably be below 2.40, more preferably 1.95, in marine mode; and preferably below 5.50, more preferably 4.50, in road mode.

Finally, Figures 11 and 12 show simplified side views of a planing amphibious vehicle PV. Such a vehicle may comprise retractable road wheels (not shown) in order to allow it to plane. In each figure, the water line is designated WL. In Figure 11, the driving seat is in its lower, road going position SD; and the driver's eye level DE is below the top of the windscreen, but level with bow B. Hence, the driver's line of sight LSD is level, and the driver cannot see anything below the bow when the vehicle is on the plane. In Figure 12, however, the seat is in its upper position SU. Hence, the driver's eye level DE is above the top of the windscreen, and the driver's line of sight LSU looks down over bow B, subtending an angle α to the horizontal. Hence, the driver has a deeper field of view, and vehicle safety is enhanced. This is particularly important since if the vehicle is being driven over salt water, salt spray may tend to cloud the windscreen; at least in the area outside the sweep of the windscreen wiper(s).

Further variations to the above embodiments may be incorporated as required. For example, as is known in the automotive art, the seat may also have a reclining

backrest; tilt and/or height adjustment; one or more electrically driven seat adjustment controls, with or without memory settings; heating or cooling; and adjustable lumbar and/or thigh support. It may also be feasible to build in airbags and/or other restraint systems. The seat padding may be covered in any suitable and/or desired material.

Although the present invention has been described and illustrated in detail, it is to be clearly understood that the same is by way of illustration and example only, and is not to be taken by way of limitation. The spirit and scope of the invention are to be limited only by the terms of the appended claims.